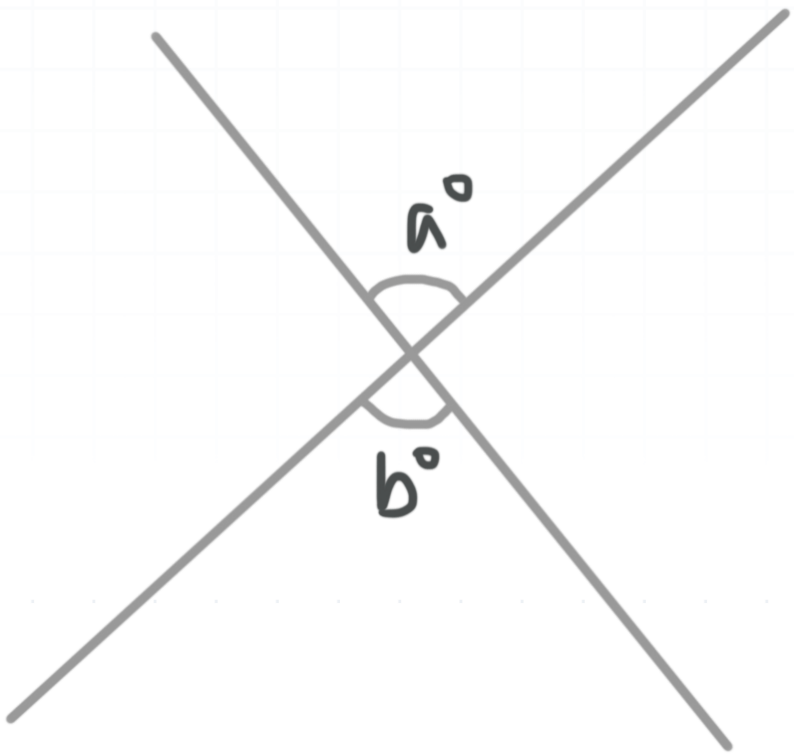
Congruent angles

In this lesson we'll look at how to use vertical angles to solve problems.

Vertical angles

Vertical angles are angles in opposite corners of intersecting lines, like these:



So vertical angles always share the same vertex, or corner point of the angle. They're a special angle pair because their measures are always equal to one another. Therefore, from the diagram we can say

$$a^\circ = b^\circ$$

or

$$\angle a \cong \angle b$$

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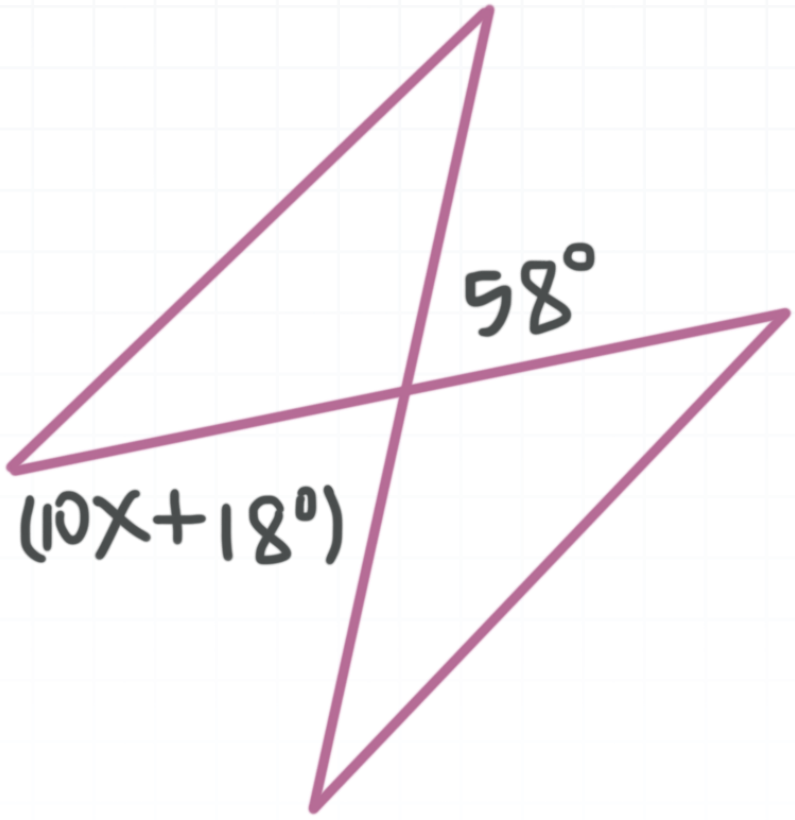
Let's do a few problems so you can get the idea.

Example

Find the value of x.



58° and $(10x + 18)^\circ$ are vertical angles, and are therefore congruent, so we can set them equal to one another and solve for the variable.

$$(10x + 18)^\circ = 58^\circ$$

$$10x^\circ = 40^\circ$$

$$x = 4^\circ$$

Let's try another one.

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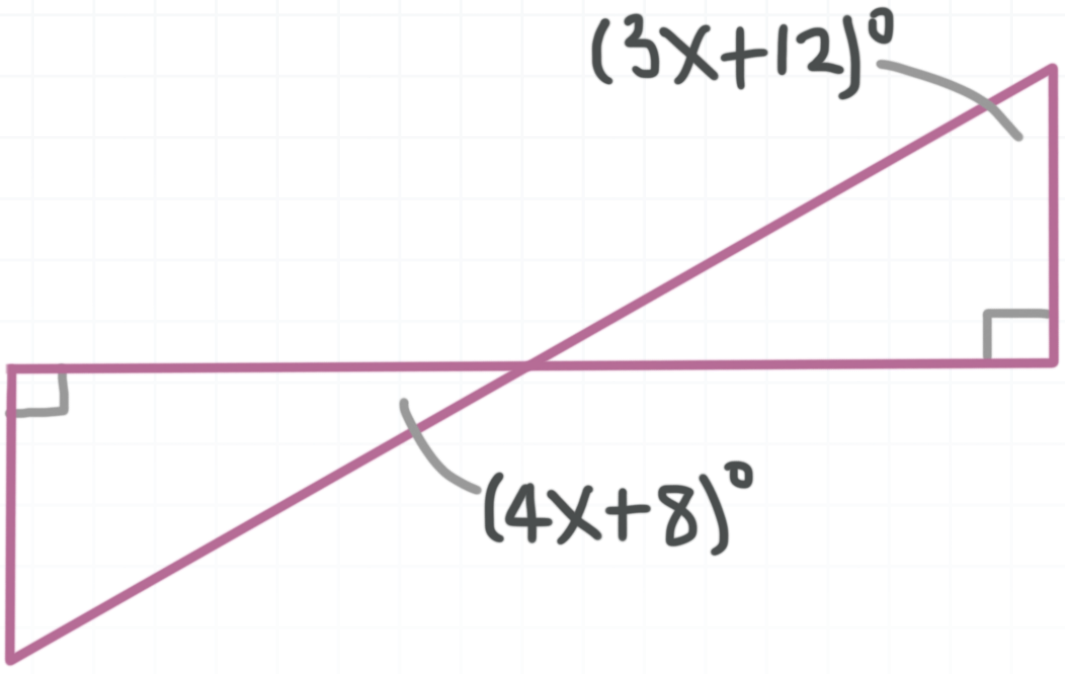
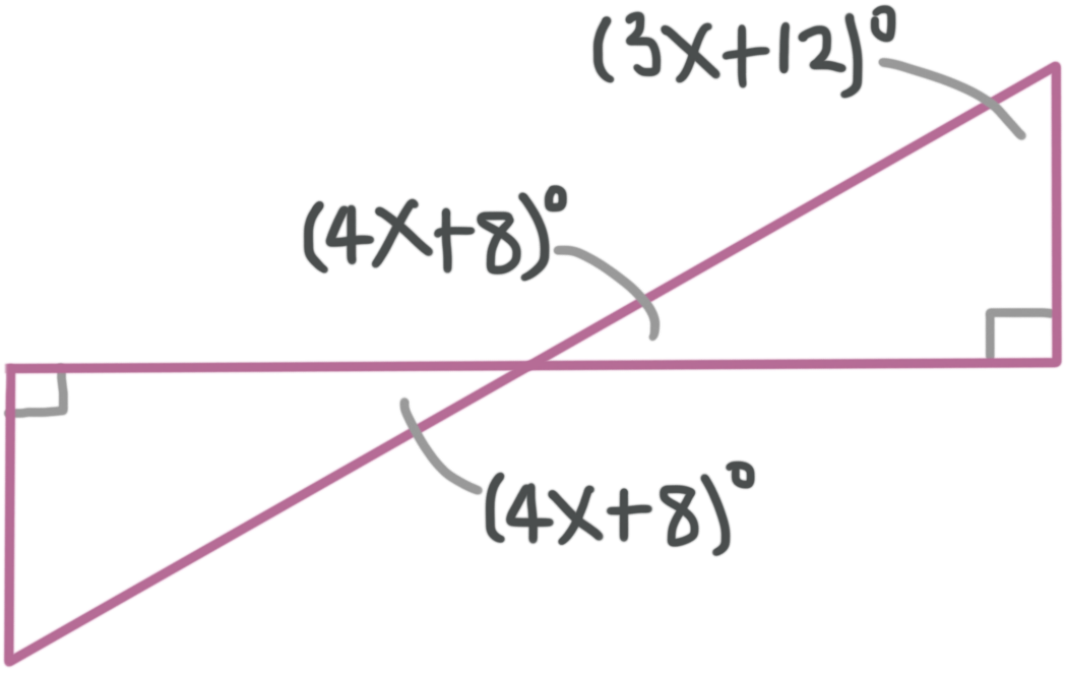
Example

Solve for the variable.



Use the fact that vertical angles are congruent to complete the triangle on the right. The angle measuring $(4x + 8)^\circ$ has a vertical angle inside the triangle on the right.



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The angles in a triangle sum to $180°$, so we can set up an equation to solve for the variable.

$$(4x + 8)° + (3x + 12)° + 90° = 180°$$

$$7x° + 110° = 180°$$

$$7x° = 70°$$

$$x = 10°$$

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